ANALYSIS OF MOUNTAINVIEW POWER PLANT USAGE AND SWQCB RESOLUTION 75-58 POLICY

(Electronic form, lacks Table 1 and Res. 75-58)

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MOUNTAINVIEW POWER PLANT
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1.0 INTRODUCTION

California State Water Resources Control Board (SWRCB) Resolution No. 75-58, Water Quality Control Policy on the Use and Disposal of Inland Waters Used for Power Plant Cooling mandates the California Regional Water Quality Control Boards (RWQCB) to implement a consistent program within California to evaluate the use of inland waters for power plant cooling and the disposal of power plant cooling waters. In particular, this Resolution has been used to guide the RWQCBs and other State agencies to evaluate the use of freshwater for new power generating facilities.

The purpose of this paper is to identify issues associated with SWRCB Resolution No. 75-58 as they relate to the Application for Certification (AFC) submitted to the California Energy Commission (CEC) by Mountainview Power Company, LLC (MVPC) for the proposed expansion of the MVPC Project located in San Bernardino County. The following discussion summarizes the Inland Water Policy and provides an analysis of various alternatives cooling technologies (dry cooling, hybrid cooling) and alternative sources of cooling water for the MVPC Project.

2.0 INLAND WATER POLICY OVERVIEW

SWRCB Resolution No. 75-58 (Attachment 1) was adopted on June 19, 1975. The Resolution provides statewide water quality principles and guidance for adoption of discharge requirements, and implementation actions for power plants that depend upon inland waters for cooling. Inland waters are defined as all waters within the territorial limits of California exclusive of the waters of the Pacific Ocean outside of enclosed bays, estuaries, and coastal lagoons. Fresh inland waters include inland water (both surface water and groundwater) suitable for use as a source of domestic, municipal, or agricultural water supply or that provide habitat for fish and wildlife.

Resolution 75-58 states that from a water quantity and quality standpoint, the source of power plant cooling water should come from the following sources (in order of priority):

Wastewater being discharged to the ocean

Ocean water

Brackish water natural sources of irrigation return flow

Inland wastewaters of low TDS, and

Other inland waters.

Where the SWRCB has jurisdiction, use of fresh inland waters for power plant cooling will be approved by the Board only when it is demonstrated that the use of other water supply sources or other methods of cooling would be environmentally undesirable or economically unsound. The Board will consider the reasonableness of the proposed water use when compared with other present and future needs for the water source, and when viewed in the context of alternative water sources that could be used for other beneficial purposes. Furthermore, the SWRCB encourages the use of wastewater for power plant cooling.

3.0 SITE BACKGROUND

The AFC for the MVPC Project proposes to expand the former San Bernardino Generating Station plant to a nominal 1056-megawatt, natural gas-fired combined cycle power plant. The Project will require up to

7,500 acre-feet of water per year, approximately 96% of which will be used for cooling purposes. The proposed technology is wet cooling. The proposed source of cooling water is groundwater from two on-site production wells and the off-site Gage Canal wells. The extracted groundwater will not be used for drinking water at the facility. Reclaimed water from the City of Redlands Waste Water Treatment Plant (WWTP) may be also be used as a source water for cooling. Wastewater discharge from the power plant facility will be discharged to the Santa Ana Regional Interceptor (SARI) waste pipeline.

The MVPC lies within the Bunker Hill Groundwater Basin. The groundwater system beneath the site consists of three distinct water-bearing zones or aquifers each separated by confining clay members or aquitards, 50 to 300 feet thick. The aquifers are designated as the upper, middle, and lower water-bearing zones.

There are two groundwater production wells currently on the MVPC property. Well No. 1 is approximately 1,025 feet deep and produces groundwater from the lower aquifer at a depth below 793 feet; it has been pumped at a rate as high as 2,750 gpm. Well No. 2 is 992 feet deep and also produces groundwater from the lower aquifer at a depth below 776 feet; it has been pumped at a rate as high as 2,443 gpm. The Gage Canal Company Well No. 56-1 was used historically to provide water to the MVPC. The well is approximately 1,126 feet deep and produces groundwater from the middle aquifer (below a depth of 467 feet) and the lower aquifer; it has been pumped at a maximum rate of 3,200 gpm.

4.0 ALTERNATIVE ANALYSIS

The following is a discussion and analysis of various alternatives cooling technologies (dry cooling, hybrid cooling, once through cooling) and alternative sources of cooling water (reclaimed source water, middle aquifer water, lower aquifer water) for the MVPC Project.

4.1 Dry Cooling

The use of dry cooling generally requires increased capital costs and operational costs while reducing water needs. Hybrid cooling involves using a combination of both dry and wet cooling. Hybrid cooling also generally requires increased capital costs and operational costs while reducing water needs. The lower efficiency of dry cooling is another drawback to the use of dry cooling. MVPC evaluated the use of dry and hybrid cooling. This comparative analysis is attached as Enclosure A to this paper. The use of dry cooling was found to result in an incremental annual cost to the proposed project of $7.8 million. The use of hybrid cooling, also referred to as wet/dry, resulted in the same incremental annual cost because the savings from reduced capital costs were offset by increased chemical treatment costs and other costs.

4.2 Wet Cooling

Wet cooling generally requires less capital outlay, but consumes greater quantities of cooling water. Indeed, in its analysis MVPC determined that wet cooling saved $7.8 million as compared to dry cooling or hybrid cooling. Wet cooling is forecasted to use an average of 4,517 gpm, whereas hybrid cooling required only 2,207 gpm make-up water. MVPC, however, plans to cycle water at least 20 times in order to maximize efficient use of make-up water

4.3 Once Through Cooling

An alternative to cycling make-up water would be to use wet cooling in a once-through mode. Typically once through cooling is utilized under circumstances where attainment cost issues for make-up water do not arise such as the use of seawater for cooling. MVPC evaluated once-through cooling but found the increased costs associated with once-through cooling and its excessive use of inland waters to be prohibitive of this alternative.

4.4 Middle Aquifer Source Water

MVPC also evaluated the various sources of make-up water potentially available for the project. Though adequate water is available from lower the aquifer, both from existing MVPC wells and proposed. MVPC has also considered use of the middle aquifer.

As summarized in Table 1, the benefits of supplying MVPC with groundwater from the middle aquifer are:

> Groundwater produced from the middle aquifer is of poorer quality than the lower aquifer due to the potential impact of the Crafton Redlands plume and is therefore consistent with the requirements of SWRCB Resolution No. 75-58

The disadvantage of using middle aquifer groundwater for the cooling water is:

> The TDS is slightly higher than the lower zone; in the range of 220-500 ppm.

4.5 Lower Aquifer Source Water

As summarized in Table 1, the benefits of supplying MVPC with groundwater from the lower aquifer are:

> Two existing production wells are already in use

> The lower aquifer can supply high quality water (TDS < 200 ppm) to the plant

> Existing overlying water rights guarantee MVPC the right to produce water from the lower zone.

The disadvantage of using lower aquifer groundwater for the cooling water is:

> Potential impact to other production wells in the vicinity of MVPC.

4.6 Reclaimed Source Water

Up to 75% of the total MVPC water requirements could be supplied by reclaimed water from the City of Redlands Wastewater Treatment Plant located 3 miles east of MVPC. The reclaimed water will be supplied through a pipeline from the WWTP. The WWTP is using a process sometimes called Rapid Infiltration/Extraction. In the process, secondary treated wastewater from the WWTP is discharged to a percolation basin. As the wastewater percolates through the vadose zone, physical and biological treatment occur eliminating many harmful contaminants in the wastewater. Water will be pumped from shallow extraction wells located just down gradient of the percolation ponds. The water quality of the extracted reclaimed water will be similar to the quality of the shallow groundwater in the Bunker Hill Basin (see response to Data Request #76).

According to City of Redlands WWTP staff, this process meets the definition of a disinfected tertiary recycled water as described in 22 CCR, Section 60306. In addition, this process meets with the approval of the RWQCB.

As summarized in Table 1, the benefits of supplying MVPC with reclaimed water from the City of Redlands WWTP is:

The use of reclaimed water is consistent with the requirements of SWRCB Resolution No. 75-58

The disadvantages of using lower aquifer groundwater for the cooling water are:

Slightly higher TDS 350 —400 ppm

The reclaimed water will require treatment with a biocide prior to its use in the cooling towers to minimize the growth of microorganisms.

Reliability of the reclaimed water supply may be an issue; on-site groundwater production wells would be maintained to guarantee a continuous supply of water to the plant.

5.0 Conclusion

In light of SWRCB Resolution No. 75-58 MVPC recognizes the issues associated with the use of inland waters for the project. The use of the lower aquifer presents the most conflict with Resolution 75-58. However, MVPC has clearly define rights, pre-existing, to lower aquifer water. Nevertheless, MVPC intends to utilize up to 75% of its cooling water from the City of Redlands Waste Water Treatment Plant. Additionally, MVPC will cycle water use to the maximum extent possible. It appears that use of the middle aquifer may also present a viable, advantageous, and preferable method of addressing Resolution 75-58 in ensuring that precious inland water sources are utilized in the most effective means possible.